Interdisciplinary Instrumentation Colloquium

Specific Heat Measurements of Films and Tiny Crystals Using Si-micromachined Nano-calorimeters

Speaker: Frances Hellman
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Date: Wednesday, March 1, 2006
Time: 4:00 PM sharp
Place: LBNL, Building 50 Auditorium
(directions at http://InstrumentationColloquium.LBL.gov)

We have used Si micromachining to fabricate membrane-based calorimeters for measuring thermodynamic properties of microgram-quantity samples over a wide temperature and magnetic field. Prototype scaled down devices have been made which allow precise measurements of nanogram quantities. These devices are particularly useful for specific heat measurements of thin film samples (100-400 nm thick) deposited directly onto the membrane through a Si micromachined evaporation mask. They have also been used for small bulk samples attached by conducting paint or In, and for powder samples dissolved in a solvent and dropped onto devices. I will discuss device fabrication and thermal analysis which allow us to precisely identify heat flow in the devices and consequent limits on the absolute accuracy, as well as possible future directions for device development. I will also briefly discuss examples of measurements on several materials of current interest.

Presentations (pdf files) and dates of future colloquia are posted at
http://InstrumentationColloquium.LBL.gov

Suggestions for speakers and topics are welcome. Please contact
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